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(71) Applicant
Mercury Personal Communications Network Limited

(Incorporated in the United Kingdom)

1 Harbour Exchange Square, Docklands, London, E14 9GE, United Kingdom

(72) Inventors
Paul Chambers
Ian Johnson

(74) Agent and/or Address for Service
W H Beck, Greener & Co
7 Stone Buildings, Lincoln's Inn, London, WC2A 3SZ, United Kingdom

(54) Telecommunications apparatus

(57) A telecommunications adaptor enables a fixed telephone system, adapted for use with the Public Switched Telephone Network, to operate over a radio telecommunications network. The fixed telephone system 1 is adapted to operate over a personal communications network (PCN), indicated schematically at 7. The connection of the wiring loop 3 of the fixed telephone system to the PSTN 4 has been severed at the entry point to the residence, and a telecommunications adaptor 8 embodying the invention has been connected into the wiring loop 3. The adaptor 8 has an antenna 9 for transmitting and receiving radio signals to and from the PCN 7. The telecommunications adaptor 8 is shown with a mobile telephone handset 10, compatible with the PCN 7, connected thereto.

FIG.1b

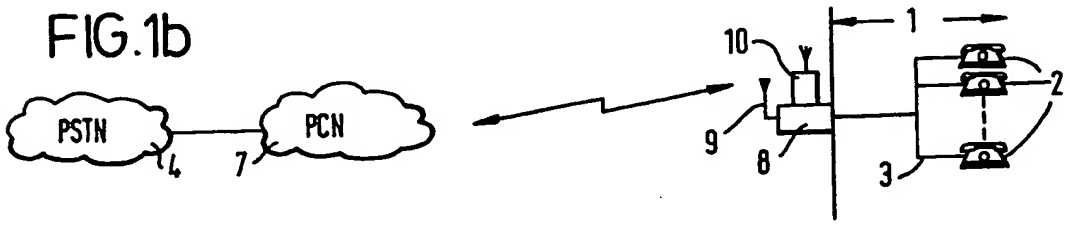

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FIG. 1a

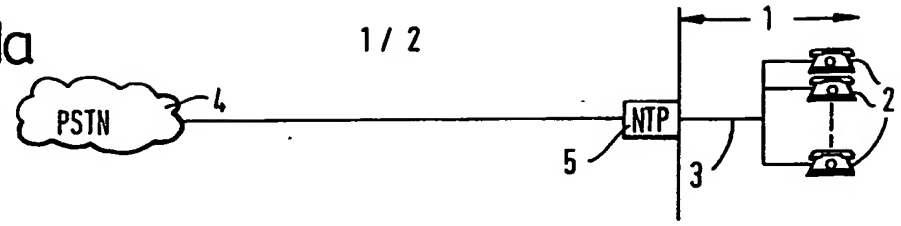


FIG. 1b

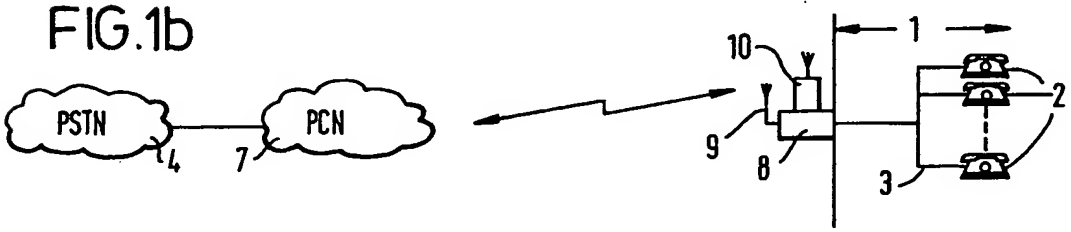


FIG. 1c

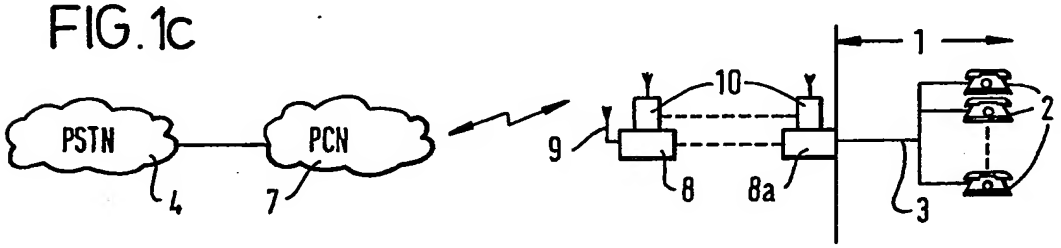


FIG. 2

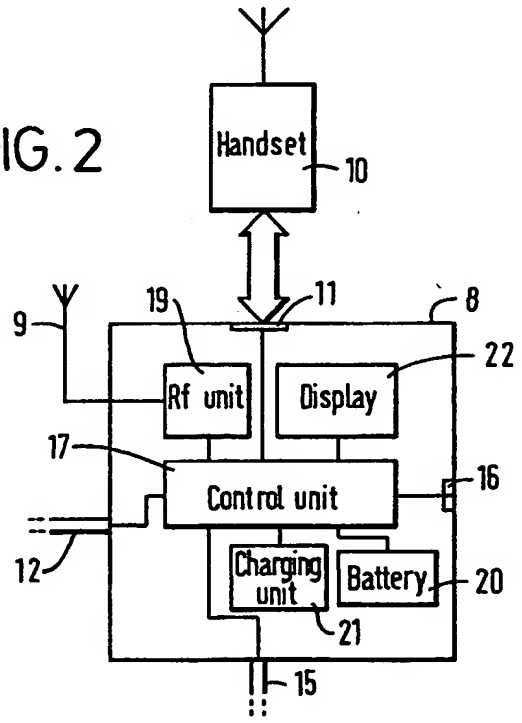


FIG. 3

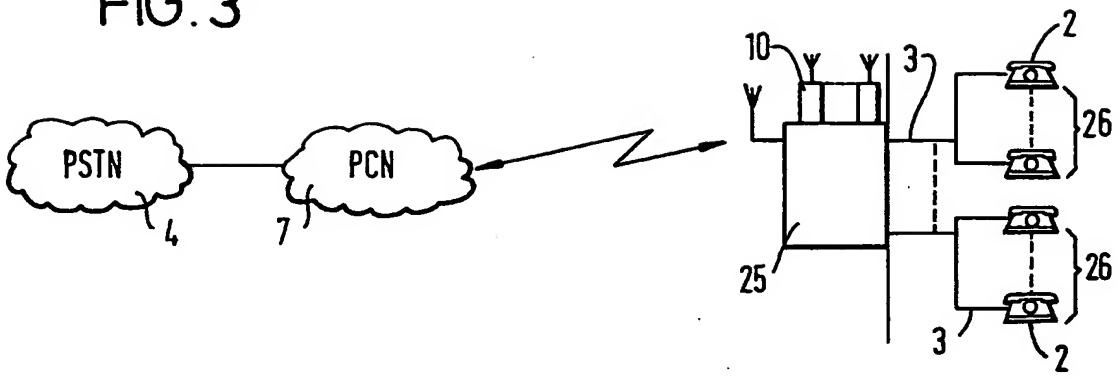
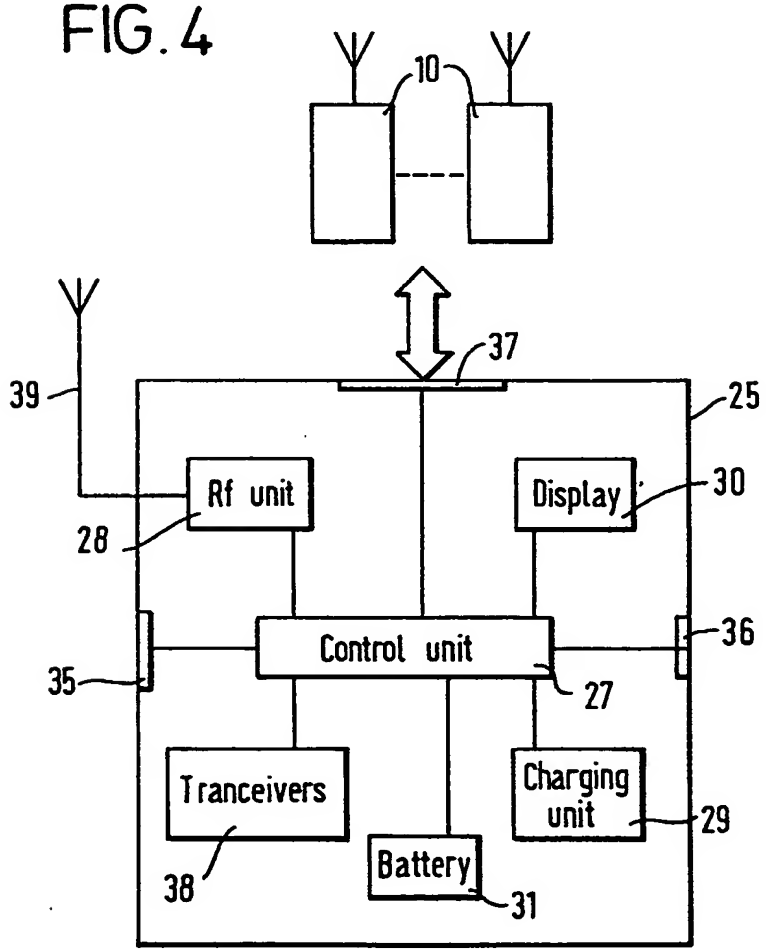

PSTN
PCN
4
7
10
3
2
26
25
26
3
2

FIG. 4


10
37
39
25
Rf unit
Display
30
28
Control unit
36
35
27
Tranceivers
Charging unit
29
Battery
38
31

TELECOMMUNICATIONS APPARATUS

The present invention relates to telecommunications apparatus for enabling a fixed telephone system, adapted for use with the Public Switched Telephone Network, to operate over a radio telecommunications network, and a method of adapting such a fixed telephone system for such operation. The expression "fixed telephone system" as used herein is intended to mean a system of telephone appliances, such as conventional telephones, telephone answering machines, and cordless telephones, which are normally connected by a wiring system into the Public Switched Telephone Network.

Traditionally in such fixed telephone systems operating over the Public Switched Telephone Network, a telephone number is associated with the location of the fixed telephone system rather than an individual. In recent times, various systems, such as cellular radio telecommunications networks have been introduced whereby a mobile telephone handset can be carried around by an individual and telephone calls can be made and received by radio transmission between the handset and a base station which is connected via an exchange into the Public Switched Telephone Network.

Personal Communications Networks (PCN's) are currently being planned with the aim of providing a number of advantages over existing radio telecommunications networks, in particular giving the user greater freedom, flexibility, convenience and control. PCN's will operate on a similar basis to existing cellular networks, but will use digital, rather than analogue, technology.

A clear advantage of radio telecommunications networks over conventional systems wired into the PSTN is that a

telephone number is associated with an individual as distinct from the fixed location of a conventional telephone. However, most homes and businesses already have installed fixed telephone systems adapted for use with the PSTN. Thus, even where a user additionally subscribes to a cellular radio network to take advantage of the mobility and additional services which are generally offered by such networks, any fixed telephone equipment in the individual's home or place of business can only be used with the PSTN.

The present invention seeks to allow a fixed telephone system to be adapted for operation over a radio telecommunications network, and in particular, though not exclusively, a PCN.

According to a first aspect of the present invention there is provided a telecommunications adaptor for enabling a fixed telephone system, adapted for use with the Public Switched Telephone Network, to operate over a radio telecommunications network, which apparatus comprises: a wiring connector for connecting the adaptor into the wiring system of a fixed telephone system; a handset connector for connection to the adaptor of a mobile telephone handset compatible with the radio telecommunications network; an antenna and/or an external antenna connection port, coupled to the handset connector to allow coupling of the antenna and/or an external antenna with the transmitter and receiver circuitry of a said mobile handset connected to the handset connector; signal generating means for generating a signal to produce a dialling tone on a telephone of the fixed telephone system and for generating a signal to cause ringing of a telephone of the said system on receipt of an incoming call signal from the radio telecommunications network; signal converter means for converting a dialling signal generated by a telephone of the fixed telephone system into a code signal for

activating a said mobile telephone handset, connected to the handset connector in use, to access the radio telecommunications network; detector means for detecting when a telephone of the system has been activated by a user for answering an incoming call or making an outgoing call; and interface means connected between the wiring connector and the handset connector for transmitting signals between the said connectors, thereby to enable a user of a telephone of the fixed telephone system to communicate over the radio telecommunications network via a said mobile handset connected to the handset connector.

The invention thus enables an individual who subscribes to a radio telecommunications network to access that network using previously installed telephones in the home or place of business, as well as in the normal way via the mobile telephone handset when the individual is away from the location of the fixed telephone system. When returning to the location of the fixed telephone system, the individual connects the mobile handset to the handset connector of the adaptor so that calls can be made and received using any of the telephones of the fixed telephone system.

The adaptor is preferably such that operation of the equipment on the fixed telephone system is unchanged after the adaptor is installed so that the presence of the adaptor is transparent to the user. Thus, the detector means preferably comprises means for detecting an "off-hook" signal from a handset or the like apparatus, for example a cordless telephone or telephone answering machine, connected to the fixed telephone system. The detector means may also be adapted to detect a corresponding "on-hook" signal.

The signal converter means can convert both loop

disconnect (pulse) dialling signals and multi-frequency (tone) dialling signals into code signals conforming to the protocol of the mobile handset.

Radio telecommunications networks generally require a dialling signal to be "assembled", after all digits have been dialled, before the signal is transmitted to the network. Thus, the signal converter means preferably includes means for detecting a pause in dialling activity on a telephone of the fixed telephone system, thereby to identify the end of the dialling signal, prior to actuation of the mobile handset. However, since some cordless telephone handsets currently available require the user to press a particular function key after dialling, the signal converter means is preferably adapted to detect depression of such a function key prior to activation of the mobile handset.

The antenna and/or the external antenna connection port may be coupled to the handset connector by a hardware r.f. connection. Alternatively, for example, an inductive loop or capacitive coupling mechanism may provide the coupling to the handset connector.

When the mobile handset is connected to the handset connector, the transmitter and receiver circuitry of the handset is preferably automatically "switched/coupled" from the handset's antenna to the adaptor's antenna or antenna connection port. Connection of an external antenna to the connection port, where provided, may allow improved performance.

The signal generating means preferably generates a signal to indicate to a user attempting to use the fixed telephone system that a mobile handset has not been connected, or has not been properly connected, to the

handset connector of the adaptor. For example, the signal generating means may cause a particular tone to be produced on lifting a handset of the fixed telephone system.

The adaptor may be powered from a d.c. supply or from the mains power supply. In the latter case, the adaptor includes a mains connector for connection of the adaptor to the mains power supply in use. However, it is preferred that the adaptor also includes internal power supply means operable in the event of disruption of the mains power supply. For example, the adaptor may incorporate a rechargeable battery which can be charged, during normal operation, from the mains supply. Alternatively, the adaptor may be adapted to receive standard disposable batteries which can be replaced by a user as required. In any case, in the event of disruption of the mains supply to the adaptor, the adaptor preferably switches automatically to the internal power supply.

The adaptor may also include a charging unit for charging the battery of a mobile telephone handset connected to the handset connector. Such a charging unit may be operable in more than one mode to provide, for example, rapid charging and slow charging of the handset battery. Where the internal power supply means comprises a rechargeable battery, such a battery may also be charged by the charging unit. Further, the charging unit may be arranged to charge an external battery pack, provided separately of the adaptor and connectable thereto via an appropriate connector, as an additional safeguard against failure of the normal power supply.

It is preferred that the adaptor incorporates a display, which may be, for example, an alphanumeric display or an LED display, to indicate to a user information on the state of the adaptor. For example, the display may

indicate when a mobile handset has been correctly connected to the handset connector, and the charging status of the mobile handset battery and of any internal or external rechargeable power supply.

It will be understood that the invention enables an individual to be contacted on a single telephone number, both inside and outside the home or place of business at which the fixed telephone system is located. Of course, more than one telephone number may be associated with a particular handset. Further, more than one adaptor may be provided at any particular location such that connection of any one of the handsets to the associated adaptor enables correct operation of the devices on the fixed telephone system. Where more than one handset is connected to its associated adaptor, network calls to the telephone number of any of these handsets can be answered via the devices on the fixed telephone system.

When the mobile handset is connected to the handset connector of the adaptor, the keypad, earpiece and mouthpiece of the handset may be disabled for the duration of the connection. For example, the adaptor may detect correct connection of a handset, and cause a signal to be sent to the handset to trigger switches to disable the keypad, earpiece and mouthpiece of the handset. Such a signal may also result in switching of the handset transmitter and receiver circuitry to the antenna, or external antenna connection port, of the adaptor as previously described.

It may be desirable for an adaptor in accordance with the invention to include transmitter and receiver circuitry. A particular example of this is where an adaptor is provided for connection into the wiring systems of a number of fixed telephone systems at the same

location, such as would be required by a PABX.

Thus, according to a further aspect of the invention there is provided a telecommunications adaptor for enabling a fixed telephone system, adapted for use with the Public Switched Telephone Network, to operate over a radio telecommunications network, which apparatus comprises: a wiring connector or connectors for connecting the adaptor into the wiring system of one or more fixed telephone systems; transmitter and receiver circuitry for transmitting signals to and receiving signals from the radio telecommunications network; signal generating means for generating a signal to produce a dialling tone on a telephone of a said fixed telephone system and for generating a signal to cause ringing of a telephone of the said system on receipt of an incoming call signal from the radio telecommunications network; signal converter means for converting a dialling signal generated by a telephone of a said fixed telephone system into a code signal for activating the transmitter and receiver circuitry to access the radio telecommunications network; detector means for detecting when a telephone of a said system has been activated by a user for answering an incoming call or making an outgoing call; and interface means for transmitting signals between the wiring connector or connectors and the transmitter and receiver circuitry, thereby to enable a user of a telephone of a said fixed telephone system to communicate over the radio telecommunications network. Such an adaptor may have one or more of the features previously described with reference to the first aspect of the invention. In particular, such an adaptor may have one or more handset connectors for connection to the adaptor of a corresponding number of mobile telephone handsets, such that calls can only be made and received using a said fixed telephone system on connection to the adaptor of a corresponding handset.

It will be appreciated that the invention extends to a method of adapting a fixed telephone system, connected to the Public Switched Telephone System Network, for operation over a radio telecommunications network, which method comprises disconnecting the connection between the wiring system of the fixed telephone system and the Public Switched Telephone Network and connecting into the said wiring system a telecommunications adaptor as hereinbefore described. In particular, the invention extends to a method of adapting a fixed telephone system, connected to the Public Switched Telephone Network, for operation over a radio telecommunications network, which method comprises disconnecting the connection between the wiring system of the fixed telephone system and the Public Switched Telephone Network; connecting into the said wiring system telecommunications apparatus comprising radio transmitter and receiver means for transmitting and receiving radio signals to and from the radio telecommunications network, signal generating means for generating a signal to produce a dialling tone on a telephone of the fixed telephone system and for generating a signal to cause ringing of a said telephone on receipt of an incoming radio signal from the radio telecommunications network, detector means for detecting when the said telephone has been activated by a user for answering an incoming telephone call or making an outgoing telephone call, signal converter means for converting a dialling signal generated by the telephone into a signal for activating the transmitter and receiver means to access the radio telecommunications network, and interface means for transmitting signals between the transmitter and receiver means and the said wiring system thereby to enable a user of the telephone to communicate over the radio telecommunications network.

Preferred embodiments of the invention will now be described by way of example with reference to the

accompanying drawings in which:

Figure 1a is a schematic representation of a fixed telephone system connected into the PSTN;

Figure 1b is a schematic representation of a fixed telephone system adapted for use over a PCN by means of a telecommunications adaptor embodying the first aspect of the invention;

Figure 1c shows the system of Figure 1b modified by the connection of additional telecommunications adaptors;

Figure 2 is a schematic block diagram of a telecommunications adaptor of Figures 1b and 1c with a mobile telephone handset for connection thereto.

Figure 3 is a schematic representation of a plurality of fixed telephone systems adapted for use over a PCN by means of a telecommunications adaptor embodying the second aspect of the invention, and

Figure 4 is a schematic block diagram of the telecommunications adaptor of Figure 3.

The schematic of Figure 1a shows a domestic fixed telephone system, indicated generally at 1, supporting a number of fixed telephone appliances 2 such as conventional telephones, cordless telephones, and telephone answering machines. The wiring system or "loop" 3 of the fixed telephone system is connected in conventional manner into the Public Switched Telephone Network (PSTN) 4 at the network termination point (NTP) 5.

Figure 1b shows the fixed telephone system 1 of Figure 1a adapted to operate over a personal communications

network (PCN), indicated schematically at 7. The connection of the wiring loop 3 of the fixed telephone system to the PSTN 4 has been severed at the entry point to the residence, and a telecommunications adaptor 8 embodying the invention has been connected into the wiring loop 3. The adaptor 8 has an antenna 9 for transmitting and receiving radio signals to and from the PCN 7. In this schematic representation, the telecommunications adaptor 8 is shown with a mobile telephone handset 10, compatible with the PCN 7, connected thereto.

Figure 1c shows the system of Figure 1b adapted by the addition of further telecommunications adaptors 8a connected into the wiring loop of the fixed telephone system 1. The adaptors 8a may be indentical to the adaptor 8 or may be simplified units, incorporating only some of the elements of the adaptor 8, which operate under the control of the adaptor 8.

Figure 2 is a schematic block diagram of a telecommunications adaptor 8 and mobile handset 10 of Figures 1b and 1c. The adaptor 8 comprises a compact unit having a handset connector 11 for connection to the adaptor of the handset 10. A wiring connector 12 is provided for connection of the adaptor 8 into the wiring loop 3 of the fixed telephone system 1. A mains connector 15 is provided for connection of the adaptor 8 to the mains power supply in use. The adaptor 8 has a further connection point 16 by means of which the adaptor can be connected to a further adaptor 8 if desired.

The adaptor 8 includes a control unit 17 connected between the wiring connector 12 and handset connector 11. The control unit 17 includes interface means (not shown) for transmitting signals between the wiring connector 12 and handset connector 11 to enable a user of the fixed

telephone equipment 2 to communicate over the PCN via the handset 10 in use. The control unit includes signal generating means (not shown) for generating a signal which is transmitted to the wiring connector 12 and produces a dialling tone on a telephone 2 in the wiring loop 3 into which the adaptor 8 is connected. The control unit 17 also includes signal converter means (not shown) for converting a dialling signal, generated by a telephone 2 and transmitted to the control unit 17 via the wiring connector 12, into a code signal which is transmitted via the handset connector 11 to the handset 10 and activates the handset to access the PCN in use. The control unit 17 further includes detector means (not shown) for detecting when a device 2 of the system 1 has been activated for answering an incoming call or making an outgoing call.

The adaptor 8 has an integral antenna, indicated schematically at 9, for transmitting and receiving radio signals to and from the PCN in use. The antenna 9 is connected via an r.f. unit 19 and the control unit 17 to the handset connector 11 to enable the transmitter and receiver circuitry in the handset 10 to operate via the antenna 9 in use as will be described hereinafter.

While, in normal operation, the adaptor 8 is powered by the mains supply via the mains connector 15, the adaptor incorporates internal power supply means in the form of a rechargeable battery 20. The battery 20 is connected to the control unit 17 which controls operation of the battery 20 in the event of disruption of the mains power supply. A charging unit 21 is incorporated in the adaptor 8 for charging the battery 20 and the battery of the handset 10 from the mains power supply in use under the control of the control unit 17.

A display 22 is provided on the adaptor 8 and is

controlled by the control unit 17 to display information concerning the state of the adaptor 8 such as the charging status of the rechargeable battery 20 and battery of the handset 10, and indicate whether a handset 10 has been correctly connected to the handset connector 11.

To install the telecommunications adaptor 8, the connection of the wiring loop 3 of the fixed telephone system 1 to the PSTN 4 is severed at the entry point to the building. The wiring connector 12 of the adaptor 8 is then plugged into the wiring loop 3. The adaptor 8 can be located at any convenient access point in the building and can be wall-mounted if desired. The adaptor 8 is then connected to the mains supply via the mains connector 15.

The handset 10 will be carried by an individual when away from the premises, so that all calls to the number of the handset will reach the individual. On returning to the premises, the individual connects the handset 10 to the adaptor 8 at the handset connector 11. A convenient mounting area for the handset 10 may be provided on the adaptor 8 such that the action of placing the handset 10 in the mounting area connects the handset to the handset connector 11. The control unit 17 detects correct connection of the handset 10 to the handset connector 11 and transmits a signal to the handset which activates switches in the handset to disable the keypad, earpiece and mouthpiece of the handset. In addition, the transmitter and receiver circuitry in the handset 10 is switched from the handset's own antenna to the antenna 9 of the adaptor 8 through which it will operate while the handset is connected to the adaptor.

When the handset 10 detects an incoming call signal transmitted over the PCN 7, the signal generating means in the control unit 17 generates a signal which is transmitted

via the wiring connector 12 to all telephones 2 in the wiring loop 3 causing them to ring. When any handset of a telephone 2 is lifted, or, in the case of a cordless telephone, the telephone is switched to "on", this is detected by the detector means in the control unit 17 which allows the call to be answered via the transmitter and receiver circuitry in the handset 10, the interface means in the control unit 17 passing all the necessary signals between the handset and wiring loop 3.

When making an outgoing telephone call, the detector means in the control unit 17 detects lifting of the handset of the telephone 2, or switching of a cordless telephone to "on". The signal generating means of the control unit 17 then generates a signal which is transmitted via the wiring connector 12 to produce a dialling tone on the telephone 2. When the user dials the number on the telephone 2, the signal converter means in the control unit 17 converts the dialling signal into a code signal which is transmitted to the handset 10 for activating the handset to access the PCN. The signal converter means identifies the end of the dialling signal prior to activating the handset 10 by detecting a pause in dialling activity on the telephone 2, or where conventional operation of the telephone 2 provides for depression of a key to indicate the end of dialling, the signal convertor means detects depression of this key. The handset 10 then accesses the PCN by means of a radio signal transmitted by the antenna 9. When the call is answered, the user is able to communicate over the PCN via the transmitter and receiver circuitry in the handset 10, operating through the antenna 9, the interface means in the control unit 17 transmitting all the necessary signals between the wiring connector 12 and handset 10.

The adaptor 8 enables use of the fixed telephone system 1 over the PCN without requiring any modification in

the way the user operates a telephone 2 as compared with use over the PSTN. Thus, memory dialling and "on-hook" dialling functions, for example, are unchanged.

If the user attempts to make an outgoing call when the handset 10 has not been connected, or has not been properly connected to the handset connector 11, the signal generating means in the control unit 17 generates a signal which is transmitted to the wiring connector 12 to produce a tone in the telephone 2 to indicate to the user that a handset needs to be connected. While the handset 10 is not connected to the adaptor 8, the adaptor 8 thus serves as a call-barring device.

While the handset 10 is connected to the adaptor 8, the charging unit 21, controlled by the control unit 17, recharges the handset's battery, and, if necessary, the rechargeable battery 20 of the adaptor. The display 22 indicates the charging status of the battery 20 and that of the handset 10. In the event of disruption of the mains power supply to the adaptor 8, the control unit 17 switches automatically to the rechargeable battery 20. In addition, a separate standby battery pack may be provided for connection to the adaptor 8 for use in the event of prolonged disruption of the mains power supply. The control unit can control the charging unit to operate in a rapid-charge mode or a trickle charge mode. A keypad (not shown) may be provided on the adaptor to enable the user to select the desired charging mode.

Additional telephone adaptors 8a, each associated with a handset 10, may be connected into the wiring loop 3 utilising the connection points 16 provided on the adaptors 8 for this purpose. In this case, an incoming call to the number of any handset 10 correctly connected to the associated adaptor 8, 8a can be received in the manner

previously described on any of the telephones 2 on the wiring loop 3.

The adaptor 8 may be provided with an external antenna connection port (not shown) for connection of the adaptor to an external antenna. In this way, the adaptor 8 can make use of an external antenna, as opposed to the antenna 9, where this is necessary or desirable for improved reception and transmission.

As an alternative to the charging unit 21 being incorporated in the adaptor 8, a separate charging unit may be provided for connection to the adaptor 8 in use.

Figures 3 and 4 show a telecommunications adaptor 25 embodying the second aspect of the invention. The adaptor 25 serves as a PABX for adapting a plurality of fixed telephone systems 26 to operate over a PCN 7.

Referring to Figure 4, the adaptor 25 comprises a control unit 27, r.f. unit 28, charging unit 29, antenna 39, display 30 and battery 31, which are substantially as the corresponding elements in the adaptor of Figures 1 and 2. A plurality of wiring connectors, indicated generally at 35, are provided for connecting the adaptor into the wiring loops of the fixed telephone systems 26. A mains connector 36 is provided for connecting the adaptor to the mains power supply. A plurality of handset connectors, indicated at generally at 37, enable connection of a number of handsets 10 to the adaptor 25. The adaptor further includes transmitter and receiver circuitry 38 connected to the control unit 27.

The operation of the adaptor 25 is generally as that of the adaptor 8 previously described, except that signals are transmitted to and received from the PCN 7 using the

transmitter and receiver circuitry 38 of the adaptor 25 as opposed to that of the handsets 10. When a handset 10 is connected to a handset connector 37, calls can be made and received over the PCN 7 using the equipment on the corresponding fixed telephone system 26, the control unit 27 transmitting signals to and from the appropriate system 26.

It will be appreciated that many other variations and modifications may be made to the specific embodiment described above without departing from the scope of the invention.

CLAIMS

1. A telecommunications adaptor for enabling a fixed telephone system, adapted for use with the Public Switched Telephone Network, to operate over a radio telecommunications network, which apparatus comprises:

a wiring connector for connecting the adaptor into the wiring system of a fixed telephone system;

a handset connector for connection to the adaptor of a mobile telephone handset compatible with the radio telecommunications network;

an antenna and/or an external antenna connection port, coupled to the handset connector to allow coupling of the antenna and/or an external antenna with the transmitter and receiver circuitry of a said mobile handset connected to the handset connector;

signal generating means for generating a signal to produce a dialling tone on a telephone of the fixed telephone system and for generating a signal to cause ringing of a telephone of the said system on receipt of an incoming call signal from the radio telecommunications network;

signal converter means for converting a dialling signal generated by a telephone of the fixed telephone system into a code signal for activating a said mobile telephone handset, connected to the handset connector in use, to access the radio telecommunications network;

detector means for detecting when a telephone of the system has been activated by a user for answering an incoming call or making an outgoing call; and

interface means connected between the wiring connector and the handset connector for transmitting signals between the said connectors, thereby to enable a user of a telephone of the fixed telephone system to communicate over the radio telecommunications network via a said mobile handset connected to the handset connector.

2. A telecommunications adaptor as claimed in Claim 1 wherein the signal converter means includes means for detecting a pause in dialling activity on a telephone of the fixed telephone system, thereby to identify the end of the dialling signal, prior to activation of the mobile handset.

3. A telecommunications adaptor as claimed in Claim 1 or Claim 2 wherein the signal converter means includes means for detecting depression of a key of a telephone of the fixed telephone system to indicate the end of the dialling signal.

4. A telecommunications adaptor as claimed in any one of the preceding claims wherein the signal generating means generates a signal to indicate to a user, activating a telephone of the fixed telephone system to make an outgoing call, when a said mobile handset is not connected to the handset connector of the adaptor.

5. A telecommunications adaptor as claimed in any one of the preceding claims including a charging unit for charging the battery of a said mobile handset connected to the handset connector.

6. A telecommunications adaptor as claimed in any one of the preceding claims including a mains connector for connection of the adaptor to the mains power supply.

7. A telecommunications adaptor as claimed in Claim 6 including internal power supply means operable in the event of disruption of the mains power supply to the adaptor.

8. A telecommunications adaptor as claimed in any one of the preceding claims including a display for displaying information on the state of the adaptor.

9. A telecommunications adaptor substantially as hereinbefore described with reference to Figures 1a, 1b, 1c and 2 of the accompanying drawings.

10. Telecommunications apparatus comprising a telecommunications adaptor as claimed in any one of the preceding claims and a mobile telephone handset adapted for connection to the handset connector of the adaptor, the apparatus being adapted such that connection of the mobile handset to the handset connector causes the key pad, earpiece and mouthpiece of the handset to be disabled for the duration of the connection.

11. Telecommunications apparatus substantially as hereinbefore described with reference to the accompanying drawings.

12. A telecommunications adaptor for enabling a fixed telephone system, adapted for use with the Public Switched Telephone Network, to operate over a radio telecommunications network, which apparatus comprises:

a wiring connector or connectors for connecting the adaptor into the wiring system of one or more fixed telephone systems;

transmitter and receiver circuitry for transmitting signals to and receiving signals from the radio telecommunications network;

signal generating means for generating a signal to produce a dialling tone on a telephone of a said fixed telephone system and for generating a signal to cause ringing of a telephone of the said system on receipt of an incoming call signal from the radio telecommunications network;

signal converter means for converting a dialling signal generated by a telephone of a said fixed telephone system into a code signal for activating the transmitter

and receiver circuitry to access the radio telecommunications network;

detector means for detecting when a telephone of a said system has been activated by a user for answering an incoming call or making an outgoing call; and

interface means for transmitting signals between the wiring connector or connectors and the transmitter and receiver circuitry, thereby to enable a user of a telephone of a said fixed telephone system to communicate over the radio telecommunications network.

13. A telecommunications adaptor substantially as hereinbefore described with reference to Figures 3 and 4 of the accompanying drawings.

14. A method of adapting a fixed telephone system, connected to the Public Switched Telephone Network, for operation over a radio telecommunications network, which method comprises:

disconnecting the connection between the wiring system of the fixed telephone system and the Public Switched Telephone System Network;

connecting into the said wiring system telecommunications apparatus comprising radio transmitter and receiver means for transmitting and receiving radio signals to and from the radio telecommunications network, signal generating means for generating a signal to produce a dialling tone on a telephone of the fixed telephone system and for generating a signal to cause ringing of a said telephone on receipt of an incoming radio signal from the radio telecommunications network, detector means for detecting when the said telephone has been activated by a user for answering an incoming telephone call or making an outgoing telephone call, signal converter means for converting a dialling signal generated by the telephone into a signal for activating the transmitter and receiver

means to access the radio telecommunications network, and interface means for transmitting signals between the transmitter and receiver means and the said wiring system thereby to enable a user of the telephone to communicate over the radio telecommunications network.

15. A method of adapting a fixed telephone system, connected to the Public Switched Telephone Network, for operation over a radio telecommunications network, which method comprises disconnecting the connection between the wiring system of the fixed telephone system and the Public Switched Telephone Network and connecting into the said wiring system a telecommunications adaptor as claimed in any one of Claims 1 to 9, 12 or 13.

16. A method of adapting a fixed telephone system, connected to the Public Switched Telephone System Network, for operation over a radio telecommunications network, which method comprises disconnecting the connection between the wiring system of the fixed telephone system and the Public Switched Telephone Network and connecting into the said wiring loop telecommunications apparatus as claimed in Claim 10 or Claim 11.

17. A method of adapting a fixed telephone system, connected to the Public Switched Telephone Network, for operation over a radio telecommunications network substantially as hereinbefore described with reference to Figures 1a, 1b, 1c and 2 or Figures 3 and 4 of the accompanying drawings.

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Relevant Technical fields

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Databases (see over)

(i) UK Patent Office

(ii)

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Documents considered relevant following a search in respect of claims ALL

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
	NONE	

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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